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HYDROMETRICS

2727 Airport Road • Helena, Montana 59601 • (406) 443-4150

February 25, 1987

ENVIRONMENTAL PROTECTION
AGENCY

FEB 27 1987

MONTANA OFFICE

Mr. Gene Taylor
Environmental Protection Agency
Federal Building
301 South Park
Drawer 10096
Helena, MT 59626

Dear Gene,

Enclosed for your review are the following materials:

1) A recommended testing program for soil samples collected during monitoring well drilling. This program includes recommended chemical and physical soil test methods of selected soil samples and is based in part on the EPA CLP preliminary soils data.

2) An inventory of known potential sources for groundwater contamination in the East Helena area. The inventory includes a short description of potential contaminant pathways and includes methods for evaluation of these potential sources.

3) A narrative description of each known potential source, including associated materials and plant practices.

4) A plant map showing the location of potential contaminant sources.

5) A suggested additional Phase II drilling program. This drilling program is intended to fulfill several objectives including:

   a) Investigate suspected plant contaminant sources.
   b) Define northeast boundary of the arsenic plume.
   c) Define western edge of sulfate plume.
   d) Define path(s) of plume migration.

6) A figure showing locations of all suggested additional monitoring wells.

7) Preliminary results of groundwater samples from newly inventoried private wells.

These enclosed materials address most tasks discussed in our meeting of January 22, 1987, and summarized in my letter to you dated January 26, 1987. The enclosed materials do not completely address the following tasks outlined in our January 22 meeting.

1) Investigation of past plant practices that could potentially cause resource quality changes. Known potential sources resulting from present plant practices are described in the enclosed known potential sources inventory and the narrative description of these sources. Historical plant practices are currently being investigated; however, the investigation of historical practices is time consuming and is expected to be completed by plant personnel as soon as possible. Investigation of known potential sources will expedite the historical practices investigation.

2) ASARCO well investigation. Preliminary results from water quality sampling indicate this well has elevated concentrations of arsenic despite the generally good water quality of this well. Additional evaluation of this well is necessary to determine the significance of the water quality sampling results.

We believe your rapid review and comment on the enclosed materials is necessary so we can continue the plant water resource investigation in a timely fashion. The potential sources inventory and the proposed methods for further source evaluation addresses all known potential sources.

If you have any questions concerning the enclosed materials, please feel free to call me.

Sincerely,

Robert J. Miller

Robert J. Miller
Hydrogeologist

RJM:jy

Enclosures

SUBSURFACE DRILL CORE SAMPLES
ASARCO EAST HELENA PHASE II DRILLING

SAMPLE HOLE AND NUMBER	SAMPLE INTERVAL (ft)	SAMPLE METHOD	GENERAL SAMPLE LITHOLOGY	NO. OF BOTTLES*	DATE SAMPLED	RECOMMENDED TESTS (BOTTLES)**
DH-13-1	10-10.5	SS	Gvl,intermixed sa,si,cl	1	11/1	None
DH-13-2	15-15.5	SS	Gvl,intermixed sa,si,cl	1	11/1	None
DH-13-3	20-21.5	SS	Gvl,intermixed sa,si,cl	3	11/1	None
DH-13-4	25-25.5	SS	Gvl,si,cl,black organic stain	1	11/1	1 (SE)
DH-13-5	30-31.5	SS	Gvl,clayey,some organic stain	3	11/2	1 (SE), 1 (SE) Replicate
DH-13-6	35-36	SS	Gvl,si-cl matrix,chl & verm.	1	11/2	1 (SE)
DH-13-7	40-41	SS	Gvl,sandy prob. tert.	1	11/2	None
DH-13-8	45-46.5	SS	Si,clayey - prob volc. ash	3	11/3	None
DH-14-1	25-26	SS	Gvl,sandy clay matrix tert.	3	10/21	1 (SE) 2 combined with DH-14-2
DH-14-2	30-31	SS	Gvl,sandy-clay matrix	3	10/21	3 (w/DH-14-1 for PS,CE & remolded permeability if possible)
DH-14-3	35-36	SS	Gvl & sa, prob tert.	3	10/22	None
DH-14-4	40-41.5	SS	Gvl & sa, prob tert.	3	10/22	None
DH-14-5	45-46	SS	Gvl & sa, prob tert.	3	10/22	None
DH-15-1	25-26	SS	Gvl,sandy,silty	3	10/31	1 (SE)
DH-15-2	30-30.5	SS	Gvl,interlayered sandy clay	1	10/31	None
DH-15-3	40-41	SS	Gvl,sandy clay matrix	1	10/31	None
DH-15-4	45-46.5	SS	Gvl & sa, prob tert.	1	10/31	None
DH-15-5	50-51.5	SS	Gvl & sa as above	3	10/31	None
DH-16-1	10-11.0	SS	Gvl,intermixed sa & si	2	11/20	None
DH-16-2	15-16	SS	Gvl,intermixed sa & si	2	11/20	None
DH-16-3	20-20.5	SS	Gvl,intermixed sa & si & cl	1	11/20	None
DH-16-4	25-26	SS	Gvl,as abv. Dark organic stain	2	11/20	None
DH-16-5	30-31.5	SS	Gvl,sa matrix prob tert	2	11/20	1 (SE)
DH-17-1	27-28	SS	Gvl,sandy,some cl,org. stained	2	11/25	None
DH-17-2	35-36.5	SS	Gvl,sandy,black org. stained	2	11/25	1 (SE)
DH-17-3	41-42.5	SS	Gvl,sandy,no black stain	3	11/26	1 (SE)
DH-18-2	50-51.5	SS	Si-clay, - decomposed ash	4	12/2	4 (combined with DH-18-3)
DH-18-3	55-57	SS	Si-clay, - decomposed ash	4	12/2	4 (combined w/4 of DH-18-3 for PS CE & remolded permeability)
DH-18-4	60-61	SS	Ash-less altered. Basalt frag.	3	12/2	None
DH-18-5	65-65.5	SS	Ash as above harder	1	12/2	None

NOTES
SS=SPLIT SPOON
Gvl=GRAVEL
SA=SAND
SI=SILT
CL=CLAY
CHL=CHLORTE
VERM=VERMICULITE
VOLC=VOLCANIC
TERT=TERTIARY
FRAG=FRAGMENTS

* Soil samples stored in 8 ounce glass bottles with teflon lined lics.

** TE=TRACE ELEMENTS
PS=PARTICLE SIZE
CE=CATION EXCHANGE
SE=SEQUENTIAL EXTRACTION

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SUBSURFACE DRILL CORE SAMPLES
ASARCO EAST HELENA PHASE II DRILLING

SAMPLE HOLE AND NUMBER	SAMPLE INTERVAL (ft)	SAMPLE METHOD	GENERAL SAMPLE LITHOLOGY	NO. OF BOTTLES*	DATE SAMPLED	RECOMMENDED TESTS (BOTTLES)**
EH-100-2	10-10.5	SS	Gvl,silt & sand	1	11/4	None
EH-100-3	15-16.5	SS	Clay,silty & sand	2	11/4	None
EH-100-4	20-20.5	SS	Gvl,sand,silty clayey	1	11/4	None
EH-100-5	25-25.5	SS	Gvl,as above	1	11/4	None
EH-100-6	30-31.5	SS	Gvl,as above	2	11/4	1 (TE-SE)
EH-100-7	35-36.5	SS	Clay,silt and sand	2	11/4	None
EH-100-8	40-41.5	SS	Silty,sand - clayey	2	11/4	None
EH-100-9	45-46.5	SS	Silt	2	11/4	None
EH-100-10	50-50.8	SS	Gvl intermixed sandy clay	1	11/4	1 (TE)
EH-100-11	55-56	SS	Sa & gvl - clean	3	11/5	None
EH-100-12	60-61	SS	Clay, gravely	3	11/5	None
EH-101-2	10-11.5	SS	Sand	3	10/22	None
EH-101-3	15-16	SS	Gravel intermixed sa & si	3	10/22	1 (SE)
EH-101-4	20-21	SS	Gravel, sandy	3	10/22	None
EH-101-6	30-31.5	SS	Silt, clayey sandy	2	10/23	None
EH-102-1	5-6	SS	Gvl, si-sa matrix	1	11/6	1 (SE)
EH-102-2	10-11.5	SS	Gvl, si-sa matrix	2	11/6	None
EH-102-5	25-25.5	SS	Gvl & sa	1	11/7	None
EH-102-7	35-36	SS	Gvl & whie clay	1	11/7	None

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* Soil samples stored in 8 ounce glass bottles with teflon lined lids.

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TABLE 1 INVENTORY OF KNOWN POTENTIAL SOURCES FOR GROUNDWATER CONTAMINATION - ASARCO EAST HELENA

	KNOWN POTENTIAL SOURCES FOR GROUNDWATER CONTAMINATION	POTENTIAL PATH OF CONTAMINATION	METHOD OF EVALUATION
1.	Acid plant scrubber water treatment facility.	Leakage to groundwater.	Drill hole 19.
2.	Spiess settling pond and granulating pit.	Leakage to groundwater.	Drill hole 21.
3.	Lower Lake.	Leakage to groundwater.	Existing drill holes, plant collection sumps and well chemistry.
4.	Well by pumphouse near blast furnace flue.	Inflow of surface water drainage and process fluids.	Examine water chemistry and water level data.
5.	Sump by matte breaking floor and associated drain systems.	Movement of sump water to groundwater.	Examine fluid chemistry and water level data.
6.	Acid plant scrubber pad.	Direct leakage to groundwater.	Monitoring well DH-22.
7.	Sump by equipment washing station.	Percolation into groundwater.	Sample sump, construct DH-23.
8.	Fluid process and fire lines.	Leakage to groundwater.	Testing as part of plant study.
9.	Scrub down waters including acid plant pump tank house area.	Collection in sumps and drains and leakage to groundwater.	Compare chemistry of scrub down water and sumps. Construct well DH-22. Evaluate containment areas for potential leakage.
10.	Percolation of water downward from ore storage areas. a. Unpaved areas b. In areas prior to paving	Downward percolation to water table.	Examine drill hole soils data, surface drainage runoff patterns and unpaved area infiltration rates.
11.	Percolation of surface runoff at off site areas.	Downward percolation to groundwater.	Examine infiltration rates at off site location, and drill hole soils data.
12.	Use of Lower Lake water for dust control.	Leakage of water from collection sumps and percolation to groundwater.	Examine sumps and associated drains, well by pump house, and drill hole soils data.
13.	Washed down ore dust.	Runoff collects in sumps and and pump house well and percolates to groundwater.	Examine sumps and well by pump house.
14.	Slag piles.	Downward percolation of precipitation through slag piles.	Slag pile catchment basins study and bottle role tests.

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	KNOWN POTENTIAL SOURCES FOR GROUNDWATER CONTAMINATION	POTENTIAL PATH OF CONTAMINATION	METHOD OF EVALUATION
15.	Sinter plant wash down water.	Leakage to groundwater.	Sample sinter plant fluid chemistry, evaluate containment areas. Drill DH-26 if necessary.
16.	Potential geochemical release of arsenic from contaminated strata including area of organic contaminant.	Geochemical release of arsenic.	Evaluation of soil and groundwater geochemistry. Examine potential sources and sites.
17.	Sediments of Lower Lake, Upper Lake, Thornock Lake and unlined ditch.	Leaching of metals into groundwater.	General soil and groundwater geochemistry. Drill well DH-20 to determine if good quality Upper Lake water is modified by leakage through bottom sediments.
18.	Off site plant discharge points used prior to initiation of present plant runoff control system.	Possible poor quality sediments at discharge sites.	Review of past plant effluent disposal procedures.
19.	Other material storage and plant process procedures.	Unknown.	Review of past plant material storage and process procedures.
20.	Off site sources including landfill west of ASARCO plant.	Leaching of substances to groundwater.	Consideration off site sources including the landfill. The Hulst wells near the landfill have elevated arsenic concentration.

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DESCRIPTION OF POTENTIAL SOURCES

The following describes potential groundwater contaminant sources at the ASARCO East Helena plant site. These potential sources are associated with plant facilities, associated materials and plant practices. These potential sources are described in the same order as listed in the inventory of known potential groundwater contamination sources (Table 1).

1) ACID PLANT SCRUBBER WATER TREATMENT FACILITY

Water from the acid plant scrubber is drained to a treatment facility via a ten inch diameter PVC pipeline. The treatment facility consists of a wooden trough fluid transport system, five particulate settling dumpsters and a 68 ft. x 35 ft. x 9 ft. deep settling pond. The facility is used to remove particulates from the scrubber fluid which is then recirculated to the scrubber area or used at the sinter plant and blast furnaces for coolant. A concrete pad underlies the five in line dumpsters, but no retaining curb exists to contain spillage. The wooden trough transport system is unlined and trough leakage to concrete and the natural ground surface is apparent. The settling pond is lined with acid-protected concrete. Physical condition of the lined pond appears good.

2) SPIESS SETTLING PONDS AND GRANULATING PITS

The Spiess settling pond is lined with 8-inches of concrete and is approximately 20 ft. x 70 ft., with a maximum depth of 4 feet. condition of the pond floor is not known; however, the retaining walls are in good condition.

The granulating pit was constructed on the original slab on the ground floor of the Dross Reverb Building. Mild steel plate was used to make an enclosure. During the spiess granulating, molten material is allowed to flow into the pit. Water pumped from the spiess settling pond is fed through sprayers on the material. The water then drains through a twelve or fourteen inch diameter mild steel pipe back to the spiess settling pond. This water is again recirculated during the granulating process. Plant process water is added to the pond when makeup water is needed.

3) LOWER LAKE

Lower Lake has been described in the ASARCO Phase I Water Resources Monitoring Report. The lake bottom is a natural soil and some seepage of water from the lake is occurring.

4) WELL BY PUMPHOUSE NEAR BLAST FURNACE FLUE

The well is used for dewatering and shallow water level control for the nearby D and L storage building. Retaining walls of the well are constructed of concrete. Numerous pipes feed the well from several areas in the plant. All water entering the well can be classified as: municipal water, plant process water and groundwater. The municipal water originates from flows at several drinking fountains; plant process water is from the blast and bearing cooling water in the power house; the groundwater is pumped from a sump located at the corner of the matte breaking floor and other drains in the plant area.

The well discharge is to the plant process fluid circuit to the new tank near Thornock Lake. Water from the tank is pumped via a pipeline to Lower Lake. The well is approximately 5 feet in diameter. Depth is unknown (approximately 7 feet to water surface) and the well is in natural earth material.

5) SUMP BY THE MATTE BREAKING FLOOR AND ASSOCIATED DRAIN SYSTEM

The sump consists of a concrete manhole with an assortment of drains carrying used process water, excess surface runoff and groundwater. Characteristics of the sump floor are unknown. Water in the sump is similar in quality to Lower Lake water. Water chemistry in the sump may also be influenced by ore dust transported to the sump by runoff from precipitation and from dust control watering. Surface water runoff is collected in a drainage network associated with the collection sump. Water discharged from the sump is collected at the well near the pumphouse (see No. 4).

6) ACID PLANT SCRUBBER PAD

Acid plant scrubbers are underlain by a curbed concrete pad. The concrete is believed to be acid protected. Overflow from the scrubbers drains from the concrete pad to an acid-protected brick sump. Low pH acid scrubber fluid is drained from the sump by a 10-inch diameter PVC pipeline to the acid plant scrubber water treatment facility (see No. 1).

7) SUMP BY EQUIPMENT WASHING STATION

The equipment washing station consists of a sheltered high pressure wash area and is used to clean dust and mud from equipment and vehicles used in the smelter operation. A portion of the used wash water drains to an earth sump adjacent to the wash facility. Infiltration of wash water into the underlying earth material is considered likely.

8) FLUID PROCESS LINES AND FIRE LINES

Plant process waters are circulated through a pipeline network throughout the smelter operations area. The process pipelines also are part of the fire line system for the operation. Should leaks occur, the process fluid-fire pipeline network could be a source of groundwater contamination. Infiltration of surface runoff waters may also occur in underground valve stations located at various locations in the plant. The potential for contamination of this process fluid-fire line system is being evaluated as part of the plant study being conducted by ASARCO in cooperation with the Montana Water Quality Bureau.

9) SCRUB DOWN WATERS ACID PLANT PUMP TANKHOUSE AREA

Plant process water is used to clean up occasional acid spillage in the pump tankhouse area. The floor of the area is lined with acid-protected brick, and exposed concrete is reported to have been sealed. Wash waters are collected in an acid-protected drain and is routed through a 10-inch PVC line to the acid plant scrubber water treatment facility for treatment (see No. 1). The pump tankhouse floor appears to be in good condition and downward leakage appears to be minimal.

10) PERCOLATION OF WATER DOWNWARD FROM ORE STORAGE AREAS

Groundwater contamination could potentially occur from percolation of runoff water that crosses or accumulates in unpaved areas. In addition, areas presently paved, may have historically contributed to groundwater contamination by percolation of runoff water into the underlying soils.

11) PERCOLATION OF SURFACE RUNOFF AT OFFSITE AREAS

Plant surface water runoff patterns presently are being investigated. Additional information on off-site impacts is available from soils data from monitoring wells.

12) USE OF LOWER LAKE FOR DUST CONTROL

Lower Lake water may percolate downward in unpaved areas or collect in sumps and drainage systems (See No's 4, 5, 11 and 12).

13) WASHED DOWN ORE DUST

Ore dust has been observed to collect in sumps and drains (see No. 5). The ore dust is carried by storm runoff and sometimes by runoff from excessive water used in dust control.

14) SLAG PILES

The possibility of groundwater contamination from slag piles is described in the Phase I Water Resources Monitoring Report. Slag pile catchment basins tests and slag bottle roll tests are being conducted as part of the Phase II investigation.

15) SINTER PLANT WASH DOWN WATER

Part of the housekeeping in the sinter building requires certain areas be hosed down with water which is supplied from the plant process supply line. During water clean-up, the water is collected in the sinter plant basement. Observation reveals that this water pools on the ground in an area in the north section of the basement. No drainage from the pool is evident. The basement area on the south end of the building forms a concrete sump which collects water draining from the surrounding areas. This sump drains via a covered concrete conduit to an outside collection sump and is piped by gravity flow to the new collection tank.

16) UNKNOWN ORGANIC CONTAMINANT - POTENTIAL GEOCHEMICAL RELEASE OF ARSENIC FROM CONTAMINATED SEDIMENTS

The potential for release of metals and arsenic from contaminated strata as geochemical conditions change is being investigated. This examination includes geochemical relationship of organic contaminants and arsenic as well as other metals.

Obvious organic staining of soils and organic contamination of groundwater has been observed during drilling and sampling of three monitoring wells. Investigation of the chemistry of the organics has not identified any known potential source. Continued evaluation of soil and water chemistry and examination of potential sources and the organic contaminant extent is necessary.

17) SEDIMENTS OF LOWER LAKE, UPPER LAKE, THORNOCK LAKE AND UNLINED DITCHES

Chemical analyses have shown high concentrations of arsenic and metals in lake and ditch bottom sediment. Upper Lake upgradient from the plant area also has significant concentrations of arsenic and metals. The possibility that these metal-bearing sediments contribute to groundwater contamination by downward percolation of arsenic and metals must be considered.

18) OFF-SITE PLANT DISCHARGE POINTS USED PRIOR TO INITIATION OF PLANT PRACTICES OF RUNOFF CONTROL

Past plant discharge practices may have resulted in deposition of poor quality sediments in Prickly Pear Creek. The only known historical discharge point to Prickly Pear Creek is near the existing railroad bridge near Highway 12. The possibility of other unknown historical plant discharge practices also are being reviewed.

19) OTHER UNKNOWN MATERIAL STORAGE AND PLANT PROCESS PROCEDURES

Past plant procedures and storage areas are potential sources for contamination and are being reviewed to determine if there are any other potential contaminant sources.

20) OFF-SITE SOURCES INCLUDING THE SANITARY LANDFILL WEST OF ASARCO PLANT

Water quality results of sampled private wells show three wells (Hulst) located west of the ASARCO plant have generally good [illegible] Water level information indicates these wells are not downgradient from the ASARCO plant. The possibility of elevated arsenic concentrations in these wells from the nearby and apparently upgradient landfill must be considered.

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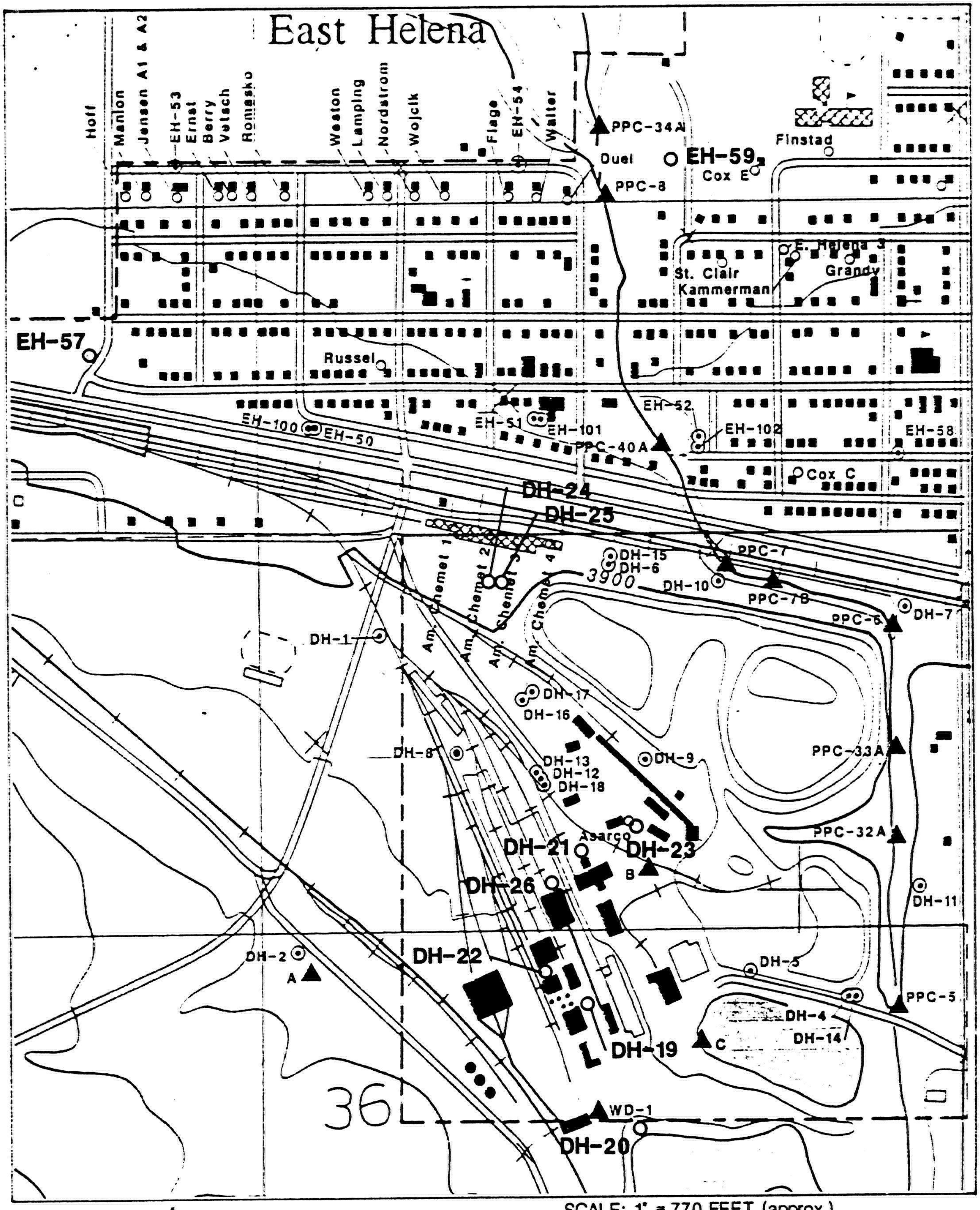
John –
this is for next mtg with ASARCO on WQ Phase II

ASARCO EAST HELENA

SUGGESTED ADDITIONAL PHASE II DRILLING PROGRAM

Proposed Monitoring Well	Well Type	Purpose
DH-19	Shallow	Determine if acid plant water treatment facility is a point source of contamination.
DH-20*	Shallow	Determine if sediments from Upper Lake are a contaminant source. This well will be drilled only if results of DH-19 or DH-22 show poor quality water.
DH-21	Shallow	Determine if Spiess pond and granulating pit are sources of contamination.
DH-22*	Shallow	Determine if acid plant is a point source of contamination. Access may be a problem.
DH-23	Shallow	Determine if soils or equipment wash sump is a source of groundwater contamination.
DH-24*	Shallow	Drill only if shallow separate organic contaminant zone is encountered above an underlying unit.
DH-25	Intermediate	Determine extent of contamination downgradient from highly contaminated well but upgradient from apparent good quality deep Am Chemet wells.
DH-26*	Shallow	Determine if Sinter Plant washdown water is a potential source of contamination.
EH-57	Shallow	Define western edge of sulfate plume.
EH-59	Shallow	Define northeastern edge of arsenic plume.

* These wells to be drilled only if necessary. Their need is dependent on results from other Phase II drill holes.



SCALE: 1" = 770 FEET (approx.)

○ Proposed Well

◉ Existing Monitor Well

Location of Proposed Additional Drill Holes -

Phase II Investigation Asarco East Helena

ASARCO EAST HELENA

PRELIMINARY WATER QUALITY RESULTS OF JANUARY 1987 PRIVATE WELL SAMPLING

Site Location/ Sample Code(s)	As	SO_4	SC	pH
Simac:				
AEH-8701-143	<.006			
AEH-8701-117	<.006	86	452	6.98
Kamerman:				
AEH-8701-118	<.006	130	488	6.70
AEH-8701-144	<.006			
Walter Well:				
AEH-8701-137	<.006	52	290	7.09
L. Hulst:				
AEH-8701-135	.024	53	425	6.60
K. Hulst:				
AEH-8701-134	.021	89	530	7.07
ASARCO				
AEH-8701-116	.024	13	385	6.03
AEH-8701-130	.05			